

TYPIIFICATION OF *ASTER JESSICAE* PIPER AND
REINSTATEMENT OF *A. MOLLIS* RYDBERG
(ASTERACEAE)

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ABSTRACT

The two names *Aster jessicae* Piper and *A. mollis* Rydberg are considered synonymous in most currently used floristic works. As the older of the two, the name *A. jessicae* has been adopted. Piper designated (marked) as "type specimen" his own collection No. 2663, from Pullman, Washington (lectotype: US!), not his No. 1604, which was widely distributed prior to publication. Some sheets of the latter have been annotated erroneously as "isotypes" by other botanists. Rediscovery of a large population of *A. mollis* in the vicinity of the type locality (Sheridan County, Wyoming) has prompted a morphological, ecological, and cytological comparison. The results indicate that the two taxa are not conspecific. *Aster jessicae* ($2n = 80$) is endemic to river valleys of the Palouse country at elevations of 1000 m or less, whereas plants of *A. mollis* ($2n = 32$) have been collected only in dry, upper montane meadows of the Big Horn Mountains in north-central Wyoming (2000–3000 m). Evidence is presented that supports reinstatement of *A. mollis* at the rank of species.

INTRODUCTION

In August of 1980, in the Big Horn Mountains of northern Wyoming, I discovered a large population of at least 150 distinct clumps of an aster unknown to me. The affinities were with members of *Aster* subg. *Symphotrichum* (Nees) A. G. Jones (1980a), but I could not identify the plants with any of the species in that group; nor could I readily suggest a hybrid origin, because there were no other *Aster* species growing nearby in the open, wind-swept, rather dry and sparsely vegetated (mostly bunch-grasses and scattered sagebrush), upper montane meadow. However, *A. occidentalis* (Nutt.) Torr. & Gray and two varieties of *A. foliaceus* Lindl. in DC. came to mind as putative parental taxa occurring in the area. Only later, when scanning the floristic literature, did I discover that my collection (AGJ 5649) had been made in or near the type locality of *A. mollis* Rydberg. The type material [Wyoming, Sheridan County, Big Horn Mountains, 7500 ft, 20 Aug 1899, *Tweedy 2029* (Holotype: NY!—Fig. 1; isotype: WS!)] furnished a perfect match to my specimens.

In his original description of *Aster mollis*, Rydberg (1901) cited as a paratype (not to be confused with the nomenclatural type) a collection from Pullman, Washington (*Piper 1604*) that was widely

The written information on this specimen has been abstracted for the TYPE REGISTER PROJECT by K. L. Chambers on July 30, 1973

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HOLOTYPE of:

Aster mollis Rydb.
MILL. TOTT. Bot. Beech. 28, 41, 1901.
Notes: *Aster mollis* Rydb. is a hom. name; *Aster mollis* Rydb. is not identical with the type of *Aster mollis* Rydb. (1898) = *Piper* Wood, which was cited by Rydb. as a paratype. As only the holotype was preserved, we are applying the name *Aster mollis* Rydb. to the same population of dry habitats in the Big Horn Mountains, Wyoming.
Det. Albert G. Jones, 1982.

Aster foliaceus Lindl., in DC.

As noted by K. L. Chambers July 30, 1973 notes: *Aster mollis* Rydb. is a hom. name due to the citation of G. V. Piper 1898, which is the type of the earlier published name *Aster foliaceus* (Gray) Steud. (1898).



Aster mollis sp. nov.

A strict perennial with a horizontal rootstock. Stem densely villous, almost tomentose, or in age more glabrate, 4-8 dm. high, simple below, with short flowering branches above. Leaves obovate to oblanceolate, 5-10 cm. long, densely and softly grayish pubescent on both sides, sessile, slightly clasping, and occasionally a little auricled at the base; heads terminating the short branches, hemispherical, disk about 15 mm high and broad; bracts herbaceous, oblong, obtuse, villous-pubescent; rays numerous, bluish purple, about 1 cm. long and 2 mm. wide.
This species reaches an elevation of 2200 m.
WYOMING: Big Horn Mountains, 1893, F. Tinsley, 2029 (type) WYOMING: 2108 Pullman, 1893, C. F. Piper, 1604.

Pull. Bot. Beech. 28: 41, 1901.



Aster mollis Rydb.
MILL. TOTT. Bot. Beech. 28: 41, 1901.
= *Aster foliaceus* (Gray) Steud. 1898

FIG. 1. Holotype of *Aster mollis* Rydb. (NY).

distributed under the misapplied name *A. integrifolius* Nutt. (DS! GH! ILL! US! WIS! WS! WTU!). This collection was also cited, however, in the protologue of *A. jessicae* Piper (1898), a species endemic to stream and river valleys of southeastern Washington and adjacent Idaho. Subsequently Rydberg (1917) placed *A. mollis* in synonymy under *A. jessicae*, citing as the habitat "river banks," which does apply to Piper's collections from the environs of Pullman, but not to Tweedy's collection from the Big Horn Mountains. This synonymy was also given by Cronquist (1943) and Ferris in Abrams and Ferris (1960), but not by Cronquist in Hitchcock et al. (1955), Davis (1952), and St. John (1963). In his treatment of the vascular flora of Wyoming, Dorn (1977) did not include either *A. mollis* or *A. jessicae*.

TYPIIFICATION OF *ASTER JESSICAE*

In the original publication, Piper's (1898:30) statement on the distribution of *Aster jessicae* reads: "Along the Palouse River at Pullman, Washington, blooming in August and September. Distributed by me under No. 1604 as *Aster integrifolius* Nutt., to which it bears no resemblance. Apparently it is nearest *A. Hendersoni* Fernald."

None of the nine sheets of *Piper 1604* examined was designated by Piper as the type. Only two of the specimens, one at WS, the other at WTU, have the name *Aster integrifolius* crossed out and replaced, in Piper's handwriting, with "*A. jessicae* n.sp." Some sheets were subsequently marked by other botanists as "isotypes" (DS! GH! US! WIS! WTU!), but not the two sheets from Piper's own herbarium at WS. The labels are uniform only in the locality and collection date: "Pullman Wash. Aug. 1893;" habitat information varies from sheet to sheet. The collection was cited as the "type" by Cronquist (1943), Dean (1966), and St. John (1963), but certainly none of the specimens can be regarded as the holotype, and no lectotype has been designated.

Cronquist (1955) pointed out that, although *Piper 1604* is the only collection cited in the original publication, there is another specimen, *Piper 2663*, also from Pullman, that is marked in Piper's own hand as "type specimen" (US 529905!—Fig. 2). The plant was collected by Piper in the year preceding the publication date for *A. jessicae*; it was labelled with that name from the outset, and the locality and habitat information ("Pullman/Along Palouse River/Sept. 1897") coincides with that in the protologue. In my opinion, this is the specimen that persuaded Piper to describe a new species. I suggest that he did not specify a type in the original description, but made special mention of his collection No. 1604 because it was so widely distributed under the misapplied name of *A. integrifolius*.



This specimen (Piper 2663) is the HOLOTYPE of *Aster jessicae* Piper, *Erythraea* 6: 30. 1898.-- It is the only sheet found that has been marked by the author himself, as a type, although this collection was not cited in the orig. publication [Piper 1604 is a Paratype, cited because it had been widely distributed under the name *A. integrifolius*. No type was designated in the original description.
 det. Almut G. Jones, 1983
 University of Illinois herbarium (ILL)

529905

2663 WASHINGTON FLORA.
Aster jessicae n. sp.
 type specimen -
 Cullman
 Along Palouse River
 Date Sept. 1897 collector C. F. Piper

DAVID H. NICHOLSON U. S. NATIONAL HERBARIUM

FIG. 2. Lectotype of *Aster jessicae* Piper (US 529905).

One must bear in mind that the type concept was not universally accepted at the turn of the century, although many American botanists, including Piper, did designate types at the time. Rules concerning the typification of names were not formulated until 1904 for submission to the International Botanical Congress, held in Vienna in 1905, where they were rejected by the assembly. They were adopted for the "American Code" in 1907 (cf. Bull. Torrey Bot. Club 34:167-178) and for the international rules of botanical nomenclature in 1930 (cf. Rendle 1934).

The collection in the U.S. National Herbarium, *Piper 2663*, "is the only specimen or other element used by the author or designated by him as the nomenclatural type" (cf. Stafleu et al. 1978:7). Evidently Piper did not keep a specimen of that number for his own herbarium (purchased for WS after his death in 1926), but I have been informed that this was not unusual and that several of Piper's types are not represented at WS (Mastrogioseppe, pers. comm.). I have designated the sheet at US (No. 529905) as the lectotype. A duplicate of *Piper 2663* (WTU!), lacking habitat information but inscribed with the name *A. jessicae* by Piper, is presumed to be an isolectotype. Specimens of *Piper 1604* are to be regarded as syntypes.

A COMPARISON OF *ASTER JESSICAE* AND *A. MOLLIS*

I have not collected any specimens of *Aster jessicae*, but living plants from two localities were sent to me and are growing in the greenhouse. According to the accompanying information (Mastrogioseppe, pers. comm.), the plants are considered rare. They grow mostly on shoulders, banks, and slopes in the vicinity of streams and rivers, but apparently some distance (up to 20 m) above the water level on drier ground. The surrounding vegetation includes many weedy species, and the only other aster in the immediate vicinity is *A. occidentalis* var. *intermedius* A. Gray. Some labels on other herbarium collections give roadsides and fields as the habitat. The elevation ranges from 600-1000 m.

Correctly identified collections are known only from Whitman County, Washington and from Latah County, Idaho. Dean (1966) and St. John (1963) also listed only these two counties for *Aster jessicae*.

For his treatment of the flora of Idaho, Davis (1952:704) cited "Streambanks and low ground; S. E. Wash. and adjacent Idaho" as the habitat, but he failed to mention the name *A. latahensis* Henderson (Contr. U.S. Natl. Herb. 5:201. 1899), a species described from Idaho that belongs in synonymy under *A. jessicae* (cf. Cronquist 1943, 1955; Dean 1966, Ferris 1960, and Rydberg 1917). The type was collected "on the prairies or slightly-wooded hills" in Latah County, American Ridge, 5 Sep 1897, *Henderson 2987* (Holotype:

US?—not found; isotypes: GH! RM! WS!). Labels on several sheets of this collection vary in habitat information. In fact, there is another sheet of *Henderson 2987* (ILL!) that differs in the collection data (30 Aug 1898). In addition to the designation "*A. latahensis* n.sp.," the label carries the inscription: "Probably a synonym of *A. jessicae* Piper. Pine-woods and Banks, Latah Co, Idaho." Although the handwriting is the same as on the isotype from RM, this sheet probably should be considered an authentic specimen, perhaps a paratype, rather than an isotype.

Aster jessicae can be characterized as follows: Plants stout, with thick creeping rhizomes. Basal rosette leaves (observed only in greenhouse plants) dark green, somewhat fleshy, with strongly expressed reticulate venation [similar to rosette leaves of *A. eatonii* (A. Gray) Howell], subpetiolate, the blades ca. 3–6(–7) cm long, much smaller than the lower cauline leaves, obovate or broadly spatulate, with rounded apices and entire or shallowly crenate, densely ciliate margins. Young shoots arising at the tips of fleshy horizontal rhizomes, some distance removed from the old stems. The entire upper half of the plant uniformly and copiously cinereous or lanate, with soft, curled trichomes. Stems erect, not caespitose, up to 1.5 m tall. Lower cauline leaves subpetiolate, the blades ovate-lanceolate, acute or bluntish, to 15 cm long and 3.5–4 cm wide, with usually entire, undulate, or sometimes shallowly serrate margins. Leaves gradually reduced in size, the middle cauline leaves narrowed toward a sessile, clasping, often dilated and auricled base. Capitulescence ample, very leafy, typically elongate-paniculate (in this regard, too, resembling plants of *A. eatonii*). Ultimate rameal leaves on the peduncles several to many, foliar, mostly unlike the phyllaries, but often one or two closely subtending the involucre. Peduncles variable in length, 0.5–4 cm. Heads relatively large, the involucre 8–10(–12) mm high. Receptacles deeply alveolate, the teeth sharp and bristle-tipped (a characteristic shared with plants of *A. laevis* L.). Phyllaries typically graduated in (4–)5–6 series, appressed to somewhat loose but not squarrose, strongly pubescent on both surfaces, linear or somewhat dilated at the base, the apex acute or bluntish, not conspicuously mucronulate; outer phyllaries entirely herbaceous, those of the second whorl with a chartaceous basal portion of ca. 30–40% (specimens of *Piper 1604* have the phyllaries more herbaceous and not as strongly graduated as the lectotype and most other specimens examined). Ligules 20–30(–32), violet or blue, 12–20 mm long and 2 mm wide. Disk florets numbering at least 40, the corollas 6–7 (–8) mm long, the lobe/limb fraction less than 0.2. Pappus sordid or at least somewhat discolored, soft, about as long as the disk corollas. Achenes purple, slightly compressed, 3.5–4(–4.5) mm long, thinly strigillose, with 4–5 straw-colored ribs.

Chromosome number $2n = 80$ [reported first by Dean (1966), and confirmed by me from two populations (*Mastrogioseppe 3401* and *3402*—ILL, WS)].

The affinities lie with *Aster cusickii* A. Gray, *A. subspicatus* Nees, and *A. laevis*. Dean (1966) suggested that the species may be of allopolyploid origin as a result of hybridization between a tetraploid ($2n = 4x = 16_{II}$) and a hexaploid ($2n = 6x = 24_{II}$) plant, with subsequent doubling of the chromosomes. Such a derivative conceivably could have been produced from a hybrid between a tetraploid plant of *A. cusickii* and a hexaploid plant of either *A. subspicatus* or *A. laevis*. Chromosome counts for such populations were reported by Allen (1984), Dean (1966), Dean and Chambers (1983), and Jones (1980b).

In addition to the type material of *Aster jessicae* and *A. latahensis* mentioned before, the following specimens of *A. jessicae* were examined. IDAHO: Latah Co., 1 mi s. of Troy, *Constance 1811* (GH, WS), *1812* (WTU); S17 T39N R3W, midslope on se. hillside of Little Bear Cr., *Heidel s.n.* (WS). WASHINGTON: Whitman Co., Armstrong, *King 52-153* (WS); S6 T14N R45E, on s. side of Hwy. 195, *Mastrogioseppe 2506* (WS); (same place) on n. side of Hwy. 195, *Mastrogioseppe 2507* (WS); (ca. same place) just w. of Pullman off Hwy. 195, *Mastrogioseppe 3401* (ILL, WS); along Union Flat Cr., sw. of Ewartsville, *Mastrogioseppe 3402* (ILL, WS); Pullman, *Pickett 355* (WS); w. of Pullman, *Pickett 1302* (WS, WTU); Pullman, *Piper s.n.* (10 sheets at GH, some annotated by Cronquist as "topotype"); w. of Pullman, *Warren 126* (WS).

Aster mollis Rydberg can be distinguished from *A. jessicae* as follows: Plants forming cespitose clumps of several to many comparatively slender stems. Rhizomes short, tangled, and strongly lignified. Rosette leaves often arising close to the base of old stems (*AGJ* and *Chance 5951*), light grayish green, not conspicuously reticulate-veined, subpetiolate, the blades ca. 1.5–4 cm long. Pubescence typically copious, soft, lanate, sometimes almost pilose, especially on the petioles and peduncles. Stems usually ascending at an angle, not erect, 30–50(–60) cm tall, not nearly as leafy as the stems of *A. jessicae*. Larger cauline leaves subpetiolate, the blades oblanceolate, to 10 cm long and 2.5 cm wide; middle and upper cauline leaves slightly clasping at the base but not auricled, those of the capitulescence relatively few in number, the peduncles often lacking rameal leaves. Capitulescences averaging fewer heads than those of *A. jessicae*, forming broad, open, corymbiform panicles. Heads medium-large, the involucre 8–9 mm high. Receptacles alveolate, the teeth pointed but not bristle-tipped. Phyllaries conspicuously squarrose, graduated in 4–5(–6) series, oblanceolate, i.e., somewhat constricted below the oblong or oblanceolate chloro-

phyllous areole, the apex acute, usually with a minute purple mucro, the outer at least somewhat chartaceous at the base, those of the second whorl chartaceous over ca. one third or more of the area. Ligules similar to those of *A. jessicae*. Disk florets often very numerous, 40–70, 5.5–6.5 mm long, the lobe/limb fraction less than 0.2. Pappus soft, whitish or only slightly discolored. Achenes 2.5–3.5 mm long, similar to those of *A. jessicae*, except for size.

Chromosome number $2n = 32$ (*AGJ 5649, 6412; AGJ and Chance 5951*—ILL).

The affinities of *Aster mollis* seem to lie with *A. foliaceus* var. *apricus* A. Gray and var. *parryi* (D. C. Eaton) A. Gray, as well as with *A. occidentalis* and, more distantly, *A. ascendens* Lindl. in Hook. However, the combination of certain characteristics does not fit well within the circumscription of any of these taxa, e.g., the caespitose habit, the copious, uniform, lanate pubescence, the almost naked, flat-topped capitulescence with relatively many-flowered heads, and the strongly squarrose phyllaries. Furthermore, the populations in the Big Horn Mountains seem to be separated by ecological factors. Some collections of *A. mollis* were made in June (*AGJ and Chance 5951*), when the snow had just receded and the meadows were moist, but at flowering time in August, the meadow habitat was quite dry. Plants of *A. foliaceus* and *A. occidentalis* also grow in montane meadows but always in more mesic situations near streams and rivers; plants of *A. ascendens* invariably are found in disturbed, somewhat weedy habitats, along roads and ditches, or about towns.

All collections of *Aster mollis* examined came from the Big Horn Mountains of Wyoming: Big Horn, Sheridan, and Washakie Counties. Plants with intermediacy toward *A. foliaceus* var. *apricus* were recorded from Natrona County (*B. E. Nelson 4257*—RM) and from Sheridan County (*AGJ 6408*—ILL), and plants approaching *A. occidentalis* from Big Horn County (*G. Fonken 714*—RM) and Sheridan County (*B. E. Nelson 4363*—RM). I have annotated a specimen from Fremont County, elevation ca. 2000 m, as “*A. ascendens* or near, with possible influence of *A. mollis*” (*B. E. Nelson 4244*—RM). In addition to the type material, the following collections are representative of *A. mollis*. Big Horn Co.: ca. 34 air mi ese. of Greybull and 12.5 air mi ne. of Hyattville, *B. E. Nelson 4910* (ILL, RM). Sheridan Co.: ca. 7 air mi sw. of Big Horn, S28 T54N R85W, *Hartman 10770* (ILL, RM); Freezeout Stock Trail, S29 T57N R87W, *Hartman 10780* (RM); above Dayton at 2200 m, *AGJ 5649*, with *Blanz and Oberwinkler* (ILL, NY, TUB); 13 mi above Dayton, *AGJ 6412, 6413* (ILL); near Arrowhead Lodge, *AGJ 6411* (ILL). Washakie Co.: at the head of Tensleep Canyon, ca. 12.5 air mi ne. Tensleep, S7 T48N R86W, *B. E. Nelson and G. Fonken 7099* (ILL, RM).

DISCUSSION

Both *Aster jessicae* and *A. mollis* are members of *A.* subg. *Symphotrichum*, a group characterized by a basic chromosome number of $x = 8$ (cf. Jones 1980a). However, results of this study indicate that the two taxa almost certainly were not derived from the same parental lineages. The principal characteristic shared by the two taxa is that of copious, uniformly distributed, lanate pubescence, but many specimens of *A. cusickii*, *A. hendersonii*, and *A. subspicatus* also exhibit copious soft pubescence. Morphologically, *Aster jessicae* seems to be more closely related to these three taxa than to *A. mollis*.

The two taxa under study are readily distinguishable by several characteristics of habit and of the inflorescence, and they are further separated by a significant difference in chromosome number. An allopolyploid origin is hypothesized for and suggested by the high decaploid chromosome number of $2n = 80$ obtained for *Aster jessicae*. On the other hand, the relatively low tetraploid number of $2n = 32$ recorded for *A. mollis*, coupled with normal behavior of the chromosomes at meiosis, may be indicative of an origin by way of reticulate evolution, rather than allotetraploidy. This notion is supported by the fact that a relatively large number of individuals were recorded at the collection localities. Mature plants showed ample production of viable achenes that could readily be germinated without stratification. Several seedlings have been successfully grown to maturity. The plants are indistinguishable from the seed parents; they certainly are not hybrids.

Most of all, *Aster jessicae* and *A. mollis* are isolated geographically and ecologically. The former is a rare endemic of the Palouse country of Washington and Idaho, found at elevations of 1000 m or less. The plants grow in river bank habitats, often associated with a somewhat weedy vegetation. By contrast, *A. mollis* has been collected only in the Big Horn Mountains of north-central Wyoming. The plants are restricted to dry, upper montane meadows at elevations of 2000–3000 m, but they form a significant and conspicuous element of a vegetation composed almost entirely of native species.

I propose that *Aster mollis* be taxonomically recognized and reinstated at the rank of species. The populations are morphologically distinct and ecologically isolated from related *Aster* species; they appear to be maintained by sexual reproduction generation after generation.

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LITERATURE CITED

- ALLEN, G. A. 1984. Morphological and cytological variation in the western North American *Aster occidentalis* complex (Asteraceae). Syst. Bot. 9: (in press).
- CRONQUIST, A. 1943. Revision of the western North American species of *Aster* centering around *Aster foliaceus* Lindl. Amer. Midl. Naturalist 29:429-468.
- . 1955. Compositae. In C. L. Hitchcock, A. Cronquist, M. Ownbey, and J. W. Thompson, Vascular plants of the Pacific Northwest. Part 5. Univ. Washington Press, Seattle.
- DAVIS, R. J. 1952. Flora of Idaho. Wm. C. Brown Company, Dubuque, IA.
- DEAN, M. L. 1966. A biosystematic study in the genus *Aster*, section *Aster*, in western North America. Ph.D. dissertation, Oregon State Univ., Corvallis.
- and K. L. CHAMBERS. 1983. Chromosome numbers and evolutionary patterns in the *Aster occidentalis* (Asteraceae) polyploid complex of western North America. Brittonia 35:189-196.
- DORN, R. D. 1977. Manual of the vascular plants of Wyoming. Vol. 1. Garland Publ., Inc., NY.
- FERRIS, R. S. 1960. Compositae. In L. Abrams and R. S. Ferris, Illustrated flora of the Pacific states. Vol. 4. Stanford Univ. Press, Stanford, CA.
- JONES, A. G. 1980a. A classification of the New World species of *Aster* (Asteraceae). Brittonia 32:230-239.
- . 1980b. Data on chromosome numbers in *Aster* (Asteraceae), with comments on the status and relationships of certain North American species. Brittonia 32: 240-261.
- PIPER, C. V. 1898. New species of Washington plants. Erythea 6:29-32.
- RENDEL, A. B. 1934. International rules of botanical nomenclature—adopted by the Fifth International Botanical Congress, Cambridge, 1930. J. Bot. 72. Supplement.
- RYDBERG, P. A. 1901. Studies on the Rocky Mountain flora—IV. Bull. Torrey Bot. Club 28:20-38.
- . 1917. Flora of the Rocky Mountains and adjacent plains. Publ. by the author, New York.
- ST. JOHN, H. 1963. Flora of southeastern Washington and of adjacent Idaho. Ed. 2. Students Book Corp., Pullman, WA.
- STAFLEU, F. A. et al., Eds. 1978. International code of botanical nomenclature. Regnum Vegetabile Vol. 97.

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